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ABSTRACT

Contained within this Health Activities Project (HAP) learning packet are activities for children in grades 5-8. Design of the activities centers around the idea that students can control their own health and safety. Within this module are teacher and student folios describing six activities which involve students in restricting their vision by wearing masks, measuring total field of vision, using a pinhole viewer, playing two games in which students rely on nonverbal communication, and testing their ability to pinpoint the location of sound sources. (CS)

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HAP HEALTH ACTIVITIES PROJECT

SIGHT AND SOUND MODULE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Folios Included in This Module

WHAT'S HAPpening? This is a teacher's information folio describing the contents and use of the program.

Mask Relay. The students play bounce-ball relay with and without vision-restricting masks and compare the results.

Field of Vision. Each student measures his total field of vision and compares it to the area in which he can see clearly enough to read.

Animal Masks. By wearing vision-modifying masks that simulate the fields of vision of different animals, the students discover how different fields of vision necessitate different kinds of behavior.

Pinhole Viewer. The students find out how the amount of light and type of lens affect images produced by a pinhole viewer.

Look, Listen, and Find. By playing two games in which they must rely on nonverbal communication, the students compare the usefulness of sight signals and sound signals.

Where Are You? The students test their ability to pinpoint the location of sound sources and discover one advantage of having two ears.

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WHAT IS HAP?

The Health Activities Project (HAP) primarily involves fifth- to eighth-grade students with their own health and safety through hands-on, discovery-approach activites. By investigating their own bodies, the students learn firsthand how their bodies function and what they can do. Most importantly, the students discover that *they* can make changes in the way their bodies perform. HAP's main purpose is to make students more aware of the control they have over their own health and safety.

Is there any order to the HAP activities?
The activities fall under four categories or areas of emphasis. We call these categories ***modules.*** HAP activities may be used independently, but work best when used in sequence within the module framework. Activities that *must* be conducted in a certain sequence contain the appropriate directions in their "Setting Up" sections.

SIGHT AND SOUND Module

Mask Relay. The students play bounce-ball relay with and without vision-restricting masks and compare the results.

Field of Vision. Each student measures his total field of vision and compares it to the area in which he can see clearly enough to read.

Animal Masks. By wearing vision-modifying masks that simulate the fields of vision of different animals, the students discover how different fields of vision necessitate different kinds of behavior.

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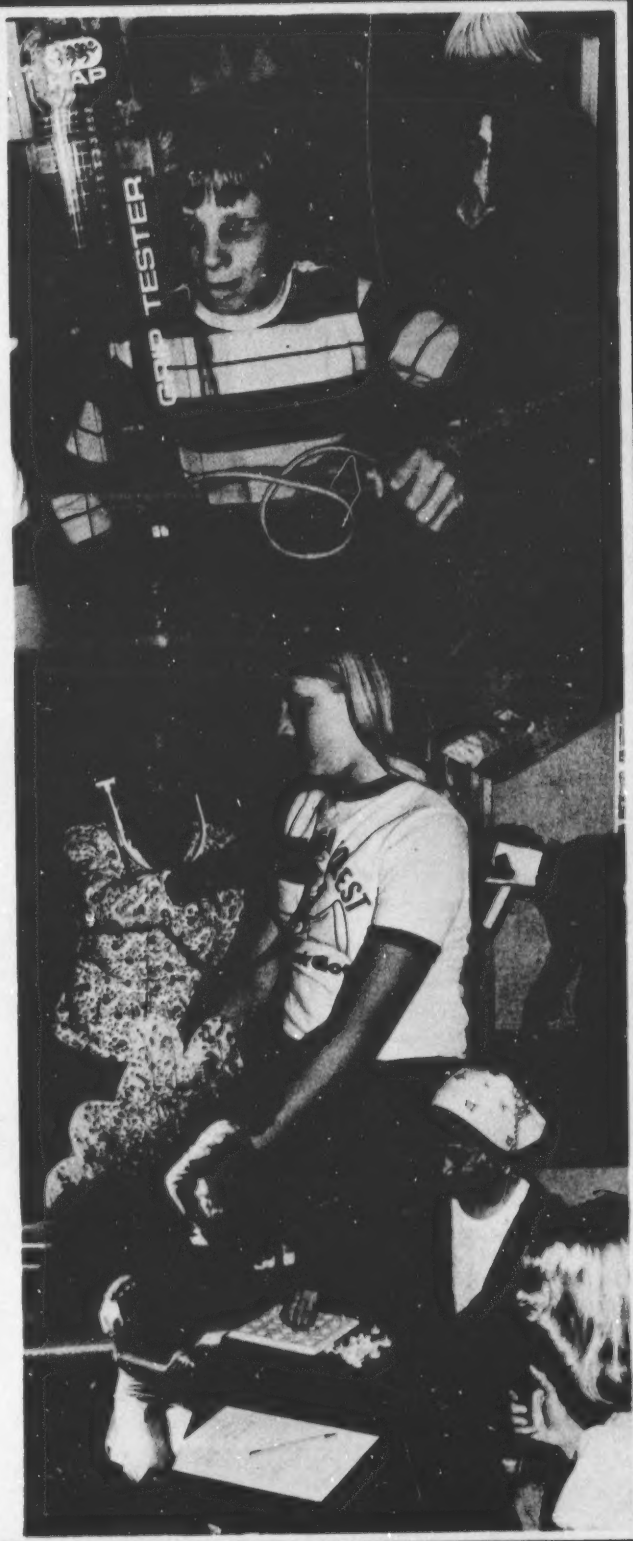
Where Are You? The students test their ability to pinpoint the location of sound sources and discover one advantage of having two ears.

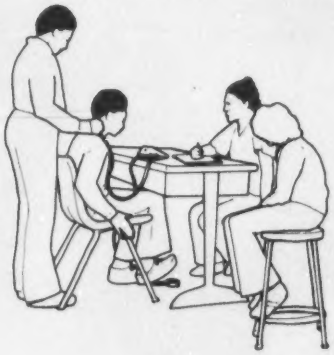
ACTION/REACTION Module

Reaction Time. The students time and compare their own reactions to light, sound, and touch stimuli.



Improving Reaction Time. The students explore the effect of a training program on their reaction times when they respond to a light stimulus. This activity introduces the students to systematic collection and analysis of data.

Let's Manipulate. By dropping pieces into matching holes, the students practice their eye / hand coordination and discover that practice can improve their performance.



HEART FITNESS AND ACTION Module

Exploring Heartbeats. The students use stethoscopes to locate their hearts and to listen to their heartbeats. They discover how various body positions affect the heartbeat rate.

Exploring Pulse. Each student locates her pulse points, measures her pulse, and compares her pulse rate to her heartbeat rate.

Pulse Recovery. After exercising, the students monitor the recovery of their pulse rates from the increased rate during exercise to their resting rates.

Shape Up. By monitoring their pulse recovery during a period of physical conditioning, the students discover that training can improve physical condition and pulse recovery time.

Grip Strength. After determining the strength of their grips, the students train for one week to improve their grip strength.

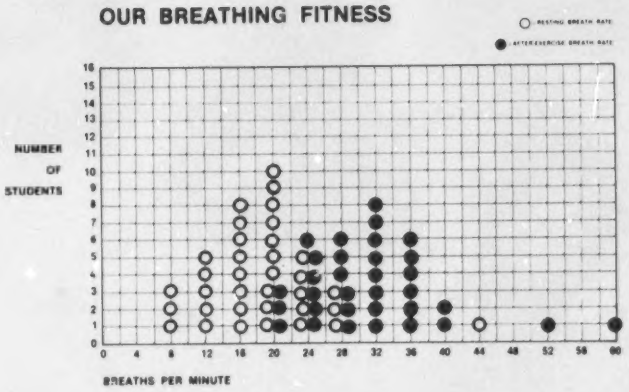
BREATHING FITNESS Module

Exploring Breath Rates. After learning how to measure their breathing rates, the students investigate the effects of breathing style, breath holding, and exercise on breath rate.

Breath Recovery. The students monitor the recovery of their breath rates after sprinting and after jogging and compare the results.

Breath Control. The students measure and practice improving their breath control.

Measuring Lung Volume. The students measure their maximum lung volumes and investigate the relationship between lung volume and height.



How do you lead a HAP activity? Your role as a HAP teacher is that of a facilitator (one who sets the stage) of learning rather than that of a purveyor of facts. Through many classroom trials we have found that, in many situations, discovery through student activity is more successful than spoon-fed knowledge. The procedure that we recommend you follow is to quickly introduce the activity, demonstrate any special procedures and equipment, and present the students with the challenge or task. Most of the allotted time should be reserved for *student* exploration. Each activity is designed to let your students learn through their own explorations. Follow the activity with questions and discussions that reinforce the students' experience with the ideas and concepts introduced in the activity.

What do you do while the students participate in the activity? While your students work, you have the opportunity to move about the room and spend your time with individuals or small groups. You can participate, lend assistance when it is needed, help students record results, or ask questions that stimulate further activity.

Be flexible. Sometimes your students may become involved in explorations or ask questions that do not lead in the direction you have planned. When this happens, be flexible. These situations can serve as interesting points of departure and often spur further exploration and learning on the part of the students.

How do you lead the discussions? The discussion at the end of the activity is an opportunity for the students to compare discoveries, review the class results, voice their opinions, and share their experiences. Avoid monopolizing the discussion; act rather as a catalyst for discussion.

THE FOLIOS

Thoroughly acquaint yourself with the contents of the activity folio before attempting to lead the activity. Each folio is laid out in a similar format so that you can quickly locate the information you need in each activity.

OVERVIEW

The Overview provides you with a capsule description of the activity.

HEALTH BACKGROUND

This section not only provides you with background information on specific health concepts, but also outlines the activity's general health significance. *Do not read this section to the students!*

MATERIALS

All materials for each activity are listed here. Materials to be provided by the teacher are marked with an asterisk. Such materials include easily obtainable equipment and duplicated Student Sheets. All other equipment is provided in the kit.

SETTING UP

This section outlines the activity's time and advance-preparation requirements. Whenever possible, have your students assist you with the preparation.

THE ACTIVITY

Suggestions on introducing the activity, demonstrating any procedures and equipment, and carrying out the activity are found in this section.

This logo indicates parts of the activity in which the students are actively involved in their explorations.

Analyzing the Data

The questions in this section are designed to help students compare discoveries and results and to interpret the results of the activity.

HEALTH APPLICATIONS

This section contains situational questions that are designed to "bring home" the health or safety significance of the activity. HAP recommends that you wait a day or two after finishing the activity before initiating these discussions.

HAP SIDETRIPS

These additional challenges may be used to extend the scope of the activity for the whole group or for interested students.

This symbol keys you to "Take-Home Ideas": activity-related exercises that the students can take home.

In some cases, the last HAP Sidetrip suggests an activity in which parents and children can participate during an "Open House" night at school.

THE INSERTS

Equipment Cards, Technique Cards, and duplicator masters of the Student Sheets for this module are contained in the module packet. You may wish to insert these sheets into the appropriate folios. The duplicator masters are provided for your use in making photocopies or

your own spirit masters. Do not write on the masters. Use them only for your reference and for the copies you make for the students.

HINTS

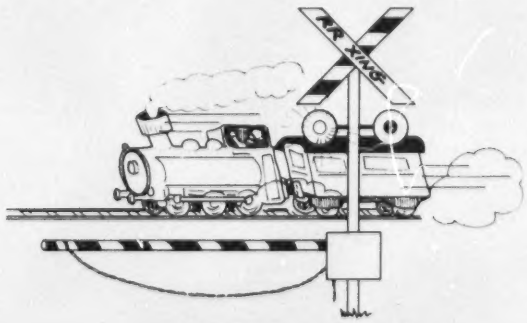
Over the years we have discovered some general approaches that improve the flow of learning in the experiential science approach employed by HAP. You probably know and use some of these techniques already, but for those of you who are unfamiliar with the experiential approach, we mention some techniques here.

1. **Equipment.** Make sure that all of the required equipment is present. Do not assume that equipment is in the box.

2. **Preparation.** Check the "Setting Up" section of the folio to find out what you have to do *before* the activity. For instance, in *Reaction Time* the batteries must be installed and the timers checked before you conduct the activity.

- **Charts.** Before posting HAP charts for your class, make sure that all data (adhesive dots, crayon markings) from previous classes have been removed.

3. **Distributing the Materials.** Do not distribute the materials until you have finished the introduction and any demonstrations, and the students have been primed with a challenge and are ready to begin. If distributed earlier, equipment often diverts the students' attention from any instructions you may still have to give.



4. **Interaction.** Hands-on, discovery-approach activities generate a great deal of student-to-student verbal interaction. While participating in HAP activities, children often spontaneously exchange observations and ideas, so be prepared for higher than normal noise levels. This activity-oriented peer interaction is a valuable part of the learning process in HAP activities, so don't discourage it. You should, of course, keep the noise level reasonable (i.e., the children don't have to shout).

WE WANT TO HEAR FROM YOU

These HAP activities have been through both local and national trials with over 2,000 children in regular classrooms. Even so, we know that you will have contributions to make to the Publisher, and we encourage you to do so. Any suggestions on format, equipment, and procedures are extremely important to future revisions. Please submit your ideas to: Dr. Roy Gromme, HAP Project Coordinator, Hubbard, P.O. Box 104, Northbrook, Illinois 60062.

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WHERE ARE YOU?

OVERVIEW

The students test their ability to locate sound sources and discover one advantage of having two ears.

HEALTH BACKGROUND

Why do you have two ears? A sound originating directly in front of or behind you reaches both ears at the same time. When a sound travels from any other direction, however, there is a small difference in the amount of time the sound takes to reach each ear. The ear closest to the sound source receives the sound signal first, thus allowing you to locate the source of a sound.

Directional perception of sound is especially important if you are trying to locate a specific sound source in the presence of other sounds. Imagine a fire truck with its siren blaring against the background noise of city traffic. If you had hearing in only one ear, you could probably hear the siren, but would not be able to determine its location. With two ears functioning, however, you would be able to determine the approximate location of the fire truck. People with hearing in only one ear compensate for such a deficiency by relying on sight and familiarity with their physical surroundings, and by turning their heads.

Auditory nerve damage to one or both ears is not uncommon in individuals who contract certain childhood diseases such as mumps, especially after the onset of puberty. Ear infections, ruptured eardrums, and excessively loud noises also contribute to hearing loss. It has been estimated that 5% of the U.S. population is deaf in one ear.

MATERIALS

For the class:
27 noisemakers (vial with metal washer)
3 blindfold masks
3 flashlights with D-cell batteries
3 copies of Student Sheet WAY*
duplicator master of Student Sheet WAY
*Provided by the teacher.

SETTING UP

Suggested Time: Conduct this activity when you can keep background noise to a minimum.
- Plan for 30 to 40 minutes for Part One.
- Plan for 30 to 40 minutes for Part Two.

Preparing for the Activity

1. Select three MODERATORS and three RECORDERS, and brief them on their duties before introducing the activity to the class. (See the "Demonstrating the Activity" section.)
- Each MODERATOR should be a student who gives instructions well.
- Each RECORDER should be able to add and keep records.

2. Arrange three groups of chairs in semi-circles, as far apart as possible.

3. Duplicate the Student Sheet.

THE ACTIVITY: PART ONE

Introducing the Activity

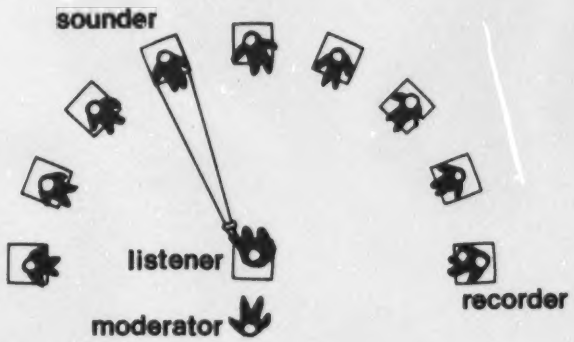
1. Ask the students if they ever have difficulty figuring out where a sound is coming from.
- What makes it difficult to locate the source of a sound?

2. Explain to the students that they will investigate their ability to locate sound sources.

Demonstrating the Activity

1. Invite eight students to help you demonstrate the game. Organize the students as follows:
- 6 SOUNDERS to give sound signals.
- 1 LISTENER to be "IT."
- 1 MODERATOR to direct the trials. (You will act as MODERATOR during the demonstration.)
- 1 RECORDER to record the data.

2. The Set Up
- The MODERATOR instructs the SOUNDERS to sit on chairs in a semi-circle. The chairs should be evenly spaced.
- The LISTENER sits on a chair in the center of the semi-circle (about six feet away from each SOUNDER) and faces the SOUNDERS.



3. The Sound Sources
- The MODERATOR gives each of the SOUNDERS a noisemaker and asks them to practice making *one sharp* sound with the noisemakers.
- During the game, the SOUNDERS hold the noisemakers in their laps and make noise *only* when directed by the MODERATOR.

4. The LISTENER
- The MODERATOR blindfolds the LISTENER and gives her a flashlight.
- The LISTENER faces straight ahead during the trials.

5. Conducting a Trial
- The MODERATOR stands behind the LISTENER.
- He quiets the SOUNDERS.
- He taps the LISTENER on the shoulder to signal her to anticipate a sound.
- He then points to *one* SOUNDER who makes *one* sharp, clear sound with the noisemaker.
- The LISTENER points the flashlight in the direction from which she thinks the sound came.

Team Name_____

Student Sheet WAY

TEAM SCORES FOR FINDING SOUND SOURCES

LISTENING WITH BOTH EARS

LISTENER's Name	Trial 1	Trial 2	Trial 3	Sum of 3 trials

TOTAL TEAM SCORE

LISTENING WITH ONE EAR

LISTENER's Name	Trial 1	Trial 2	Trial 3	Sum of 3 trials

TOTAL TEAM SCORE

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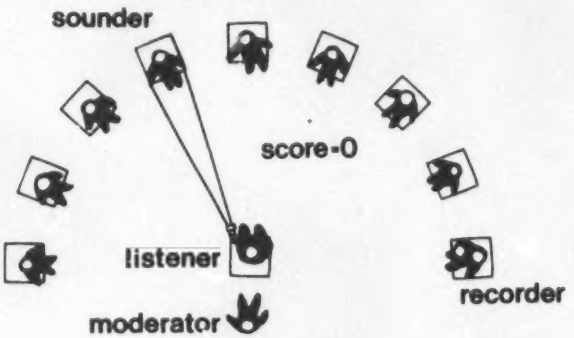
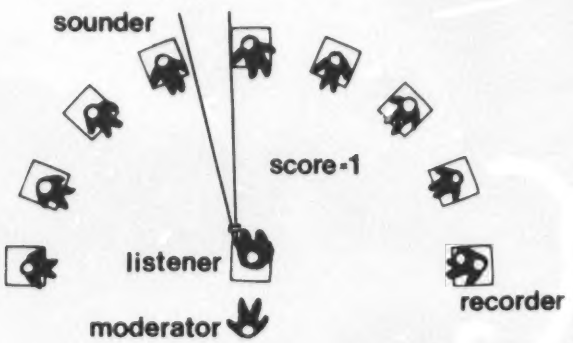
6. Determining the Score

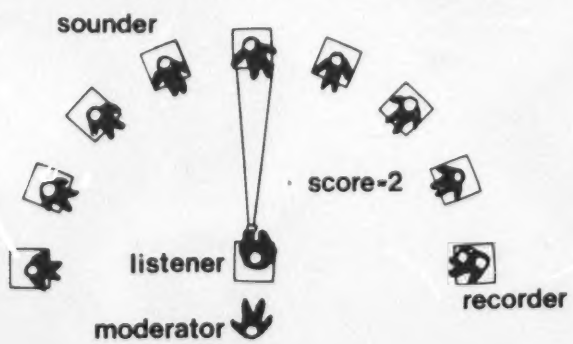
- The MODERATOR, with the help of the SOUNDERS, silently determines the LISTENER's score for the trial.
- A student or a space between students each represent 1 point off the target.
- When the flashlight shines anywhere on the SOUNDER's body or directly above his head, the LISTENER is 0 points off target. (The score for that trial is 0.)



- If the LISTENER shines the flashlight between the SOUNDER and one of the students next to her, the LISTENER is 1 point off target. (Score = 1.)



- If the flashlight shines on the student next to the SOUNDER, the score is 2 points.



7. Recording the Score. After the score has been determined, the MODERATOR *silently* signals the score (by holding up the appropriate number of fingers) to the RECORDER.

Explaining the Procedure

1. Each LISTENER takes three turns at locating a sound.

- The LISTENER's score will be the sum of the three trial scores.

2. Changing Roles

- The LISTENER and a SOUNDER switch places.
- During each game all members of a team, including the MODERATOR and RECORDER, will have a chance to act as LISTENER.
- The MODERATOR should select SOUNDERS randomly and make sure that each SOUNDER has a chance to make a sound.
- The MODERATOR selects a student to direct his trial.

Playing the Game with Both Ears

1. Divide the class into three teams.

2. Turn off the classroom lights so the light team will be easily discernable.

3. Give the MODERATOR of each team a noisemaker for each SOUNDER, one flashlight, and one blindfold.

4. Give each RECORDER a Student Sheet.

5. Instruct the MODERATORS to hold noisemaking practice and then begin trials for their teams.

- Remind the students not to shake their noisemakers unless directed to do so by the MODERATOR.

6. After all the members of the team have been LISTENERS, the RECORDER adds up all the LISTENERS' scores. This sum is the total number of points *against* that team for the first round.

THE ACTIVITY: PART TWO

Introducing Part Two

1. Tell the students that they will now discover how well they can determine the location of a sound when listening with only one ear.

2. Ask the students to predict what will happen to their ability to locate SOUNDERS.

Playing the Game with One Ear

1. The game is played the same as in Part One, except that the LISTENER completely covers one ear with her hand.

- The LISTENER holds her hand *tightly* against her ear. (She chooses which ear she wants to cover.)

2. When this round is over and the RECORDER has added up the points, she posts the scores for both rounds (two ears and one ear) on the chalkboard for class discussion.

	TWO EARS	ONE EAR
TEAM 1.	13	24
TEAM 2	21	35
TEAM 3	18	28
TOTAL CLASS SCORE:	52	87

Analyzing the Results

1. What do the total scores mean? (When interpreting the class scores, remember that the points accumulated are a measure of *inaccuracy*. A high score is a *poor* score; it indicates difficulty in locating the sound source.)

2. What are the advantages of having two ears as opposed to having only one ear?

3. Do you think you would hear better with the blindfold on or off? Why?

4. What factors other than having hearing in both ears are important in helping you determine where a sound is coming from? (Loudness of sound, background noise level, concentration.)

HEALTH APPLICATIONS

1. How would you respond to someone who considered his second ear just a "spare part?"

2. Excessively loud noises can cause a loss of hearing. Name some situations in which you could be exposed to loud noises.

- What could you do to cut down your chances of losing any of your hearing?

3. If you had to choose between having only sight or hearing for a single day, which sense would you choose? (Take class tally.) Why?

4. How could hooded parkas, hats, scarves, ear muffs, and motorcycle helmets affect your ability to determine the location of sounds?

HAP SIDETRIPS

1. Design and carry out an exercise program to improve your directional hearing skills, then play this game again to see if you have improved.

2. Play the game using different noise signals (voice, clapping, bell).

- How do different noises affect your ability to determine their location?

Take-Home Idea. Repeat this activity at home with your family and friends. How does age seem to affect one's ability to determine the location of a sound source?

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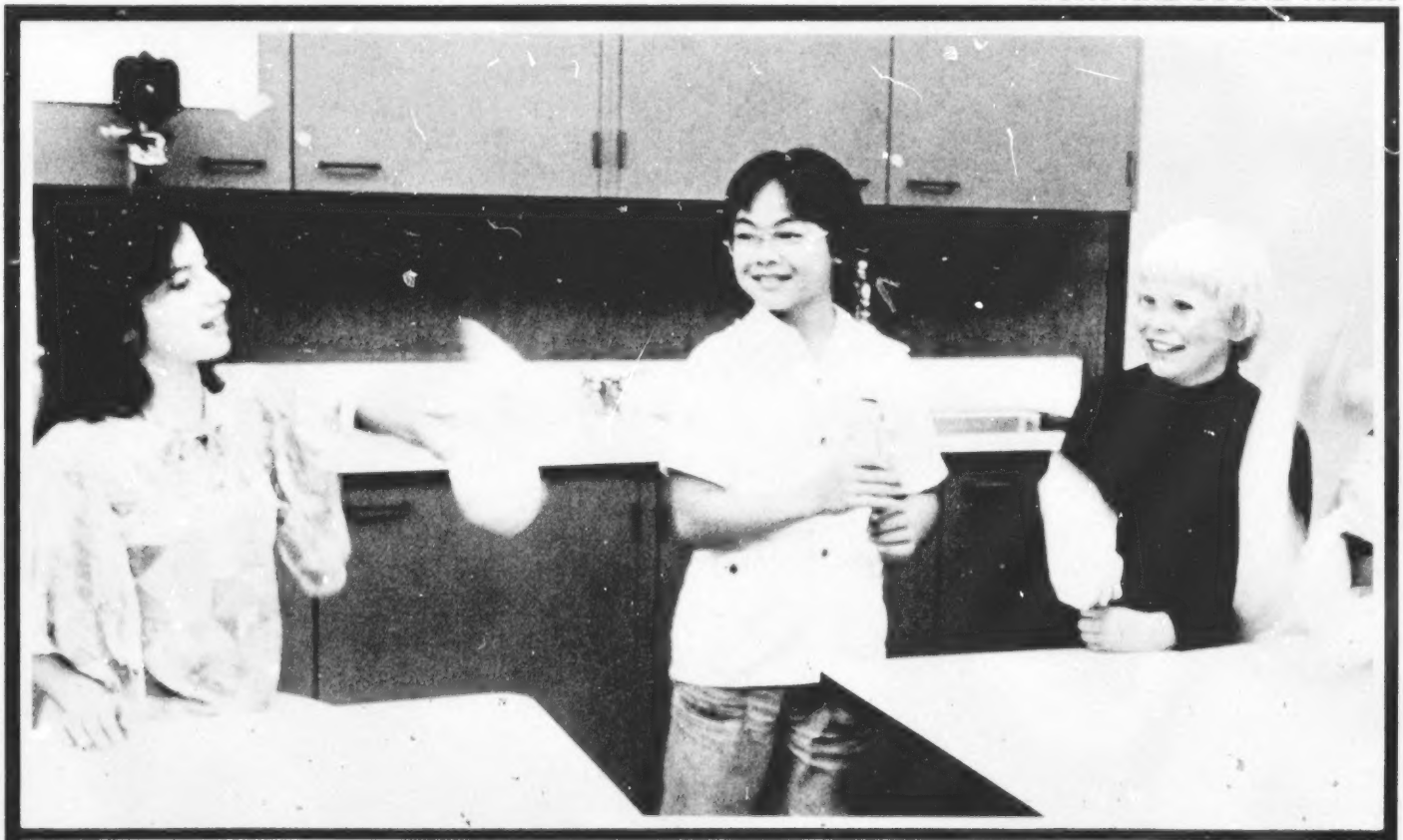
LOOK, LISTEN, AND FIND



OVERVIEW

The students play two games in which they must rely on nonverbal communication. They compare the usefulness of sight signals and sound signals in different situations.

HEALTH BACKGROUND

Every day we receive and send many nonverbal signals. Depending on the situation, either sight signals or sound signals may be easier to follow. The kind of signals we rely on may be crucial to our safety. For example, a child about to cross a street looks both ways for oncoming vehicles and doesn't see any. The sound of a siren, however, alerts her to an approaching fire engine, and she waits until it passes before she crosses.

There are many other situations in which one of our senses alerts us to a potential hazard when the other sense gives us an "all clear" signal. Because we usually rely on both sight and hearing to obtain information about our surroundings, we often are unaware of their individual limitations and advantages. Hearing allows us to receive signals from objects or persons that are out of sight, while sight allows us to receive signals when the surrounding noise level is high or confusing, or sound signals are too soft or originate from too great a distance.

During the first game in this activity, the children compare usefulness of sound cues with usefulness of sight cues in identifying an object. In the second game, the children must follow sensory cues not only to identify an object but also to identify the *task* that must be completed with the object.

MATERIALS

For each student:
1 flag (facial tissue)
1 noisemaker (washer in vial)

SETTING UP

Suggested Time: Both games should be completed in one class period.

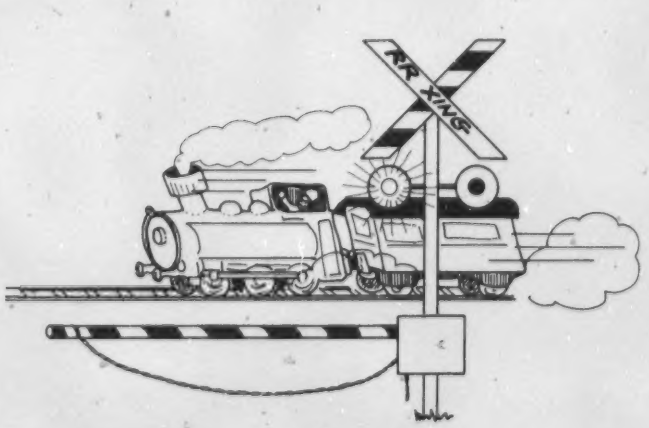
- Plan for 20 to 30 minutes for Part One.
- Plan for 20 to 30 minutes for Part Two.

Preparing for the Activity. No special preparation or game site is required.

THE ACTIVITY: PART ONE

Introducing the Activity. Introduce the activity as two games, not as a rigorous experiment.

1. Ask your students:
   - What does a skull and crossbones on a bottle mean?
   - Can you think of any other nonverbal sight or sound signals that warn us of danger or show us where help can be found? (Red cross at First Aid Station, train whistle, foghorn.) **Note:** Nonverbal sound signals are sounds that are not words.
   - Describe some situations in which both sight signals and sound signals alert us to a hazard (train crossing a street, ambulance on an emergency call).



2. Tell the students that today they will play two games in which they compare the usefulness of nonverbal sight and sound signals in different situations.

Describing the "Find an Object" Game

1. Setting up the Game

- Before each round, the class selects one student to be the *hunter*.
- The hunter then leaves the room.
- While the hunter is out of the room, the class chooses an object for the hunter to identify.
- The object must be clearly visible (a chair, the red book, John's desk, Linda's shoe).

2. Guiding the Hunter

- After returning to the room, the hunter has two minutes to identify the object.
- During the search, no verbal communication is allowed. The class guides the hunter with noisemakers.
- When a hunter is getting close to the object, everyone shakes their noisemakers vigorously.
- Louder noises indicate that the hunter is getting "warm," and decreasing or no noise indicates that the hunter is getting "cold."

3. Identifying the Object

- The hunter makes his identification guesses by touching an object or pointing to it (if it is out of reach).
- If the hunter correctly identifies the object, the group signals "yes" by clapping or giving some other nonverbal signal.
- If the identification is incorrect, the group remains silent.

Playing the Game

1. Playing with Sound Signals

- Give each child a noisemaker.
- Let the students practice making loud and soft noises.
- Ask the class to decide how they will indicate that the hunter has identified the selected object.
- Tell the students to notice how the hunter searches for the object.
- Play five or six two-minute rounds, with a different hunter for each round.
- Collect the noisemakers.

2. Playing with Sight Signals

- Give each student a flag, telling the students that they can also wave the flags to communicate with the hunter.
- Suggest to the students that they wave their flags gently when the hunter is far away from the object and more vigorously as the hunter approaches the object.
- Play several rounds of the game this way.

3. Playing with Both Signals

- Give half of the class noisemakers.
- Play several rounds of the game in which some children send sound signals while the others give sight signals.

4. Playing with Both Signals and Two Hunters

- In this last round, one hunter follows sight signals from half of the class while the other hunter follows sound signals from the other half of the class.
- Both hunters search for the same object.
- How do the hunters search?
- Who finds the object first?

Comparing Sight and Sound Cues

1. Which type of signal was more difficult to follow?

- What do you think caused the difficulty?

2. Was there a difference in searching methods between hunters who followed sight signals and hunters who followed sound signals?

- What was the difference?

3. What kinds of things interfered with reception of sight signals? With reception of sound signals?

THE ACTIVITY: PART TWO

Introducing Part Two. Tell the students that in this game, the class selects not only an object that the hunter must identify, but also a task that the hunter must complete with the object (e.g. *sit* in a *chair*, *put on* John's *jacket*).

Describing the "Complete a Task" Game. The rules are basically the same as those used in the first game.

1. Setting up the Game

- The group chooses an object and a task that the hunter must complete with the object.

2. Guiding the Hunter

- The hunter, again guided only by nonverbal signals, tries to identify the object and figure out what to do with it.
- The group gives the hunter "warm" and "cold" signals as before to find the object, and then repeats the signal procedure to let the hunter know whether she is "warm" or "cold" on the *task*.

Playing the Game

1. Have the class select a different hunter for each round.

- Encourage the group to select simple tasks.
- Set a time limit of three to four minutes for each round.
- Remind the students not to give verbal directions to the hunter.

2. Play two rounds using sound signals (the noisemakers) and then two rounds using sight signals (the flags).

Analyzing the Games

1. Which type of signal was easier to follow in this last game?

- Was the same signal easier to follow in both games?

2. Relying on nonverbal cues, which is easier: identifying an object or identifying a task?

3. If, as a game for one day, you could use only sight or hearing, which sense would you choose?

- Is this the same sense that made it easier for you to locate the object in these games?
- If not, why would you choose that sense?

HEALTH APPLICATIONS

1. You and your family are camping in the woods. On a hike, you get stuck on a cliff and can't get down.

- What kinds of signals would you give to direct rescuers to you?
- In which situations would sound signals be best?
- What would be some advantages and disadvantages of sight signals?

2. Your school is located in a busy section of town.

- What kinds of signals would you provide to notify motorists when school gets out?
- What kinds of signals could you use to caution motorists to drive carefully?

HAP SIDETRIPS

1. Play the games in different environmental conditions, such as a noisy playground, at dusk, or in a wooded area.

- How do environmental conditions affect your preference for sight or sound signals?

2. Play the games with different sight and sound signals (clapping hands, hitting a drum, flashing a light, blowing a whistle).

Take-Home Idea. Record the different sight signals and sound signals that you notice on the way home from school and around your house. Which ones are most effective in catching your attention?

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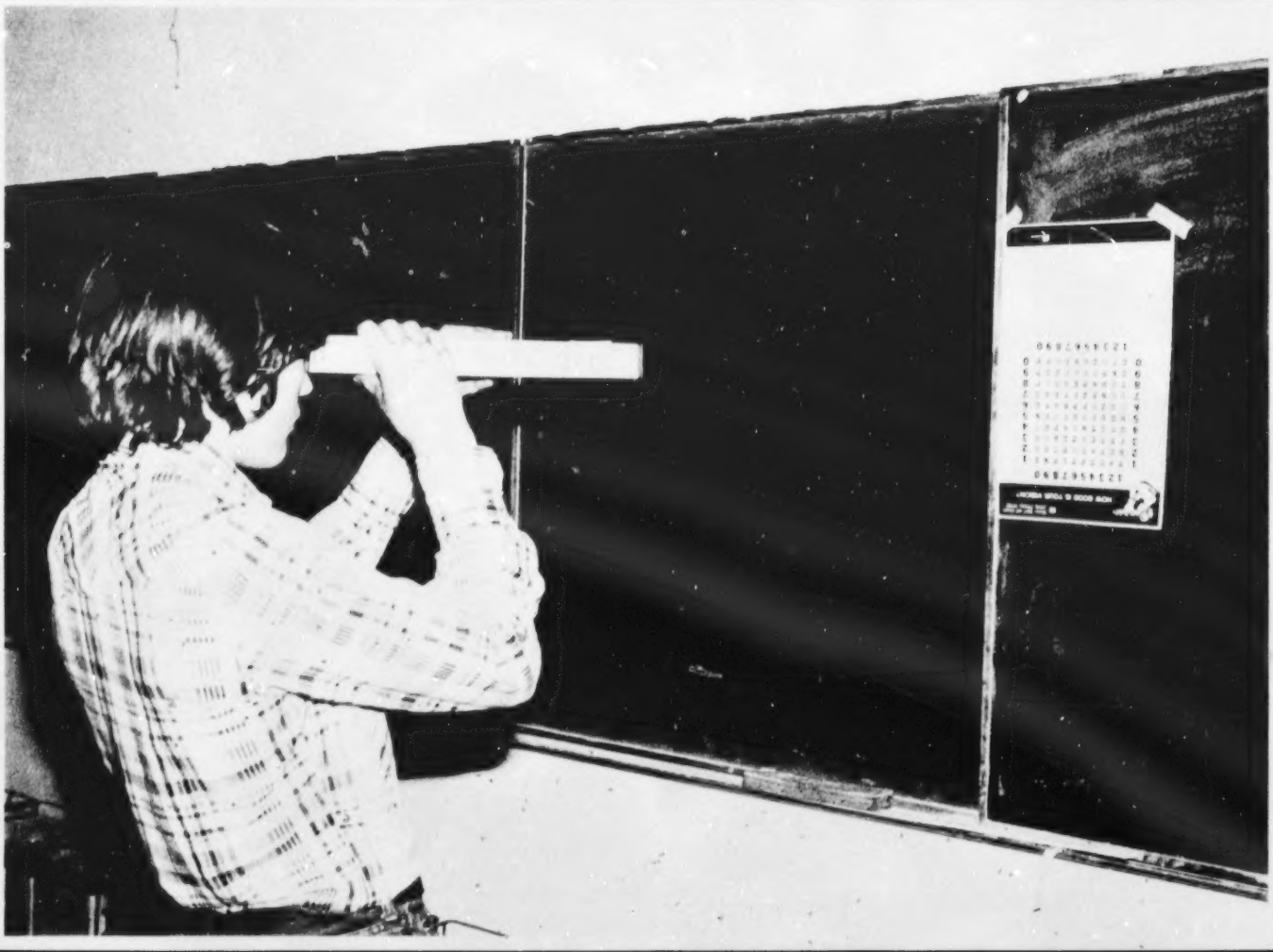
PINHOLE VIEWER

SIGHT AND SOUND Module



OVERVIEW

The students use a pinhole viewer to find out how the amount of light and different types of lenses affect images that reach the eye.

HEALTH BACKGROUND

The clarity with which we see affects not only our ability to react to the world around us, but also our understanding and enjoyment of the world. Bad eyesight can hinder our ball playing, safe skateboard riding, reading, and ability to recognize an approaching friend. Although most ten- to fifteen-year-old children do not wear glasses, 20% of these children will need glasses before they are twenty years old. Nearly everyone who reaches seventy years of age will need corrective lenses for reading. Less-than-perfect vision is one of the most common undetected health problems of elementary and junior high school students.

Defects in the natural ability of the eye to form clear images usually can be corrected with supplemental lenses (glasses). Different types of lenses correct different focusing problems. In this

activity, the students use various lenses with their pinhole viewers to determine how lenses can change and/or improve images that reach the eye.

MATERIALS

For each student:
1 pinhole viewer
3 or 4 aluminum foil dots
1 pin
1 sharp pencil*
1 set of plastic lenses (two to a set)
1 popsicle stick
1 rubber band
1 copy of each Student Sheet: PV 1* and PV 2*

For the class:
6 "How Good is Your Vision?" charts
several bright lamps* or a sunlit area*
1 pencil sharpener*
1 roll of masking tape*
optional additional lenses*
1 flashlight
duplicator masters of Student Sheets PV 1 and PV 2

*Provided by the teacher.

SETTING UP

Suggested Time:
- Plan for 30 minutes for Part One.
- Plan for 30 minutes for Part Two.
- Plan for 50 minutes for Part Three.

Preparing for the Activity

1. A brightly lit area is necessary in order for the viewers to produce clear images.
- The view through a window of a sunlit area provides observable images.
- Another alternative is to have the students look through the viewers at bright lamps. Make sure that all the classroom lights are on.
- If you cannot obtain enough light indoors, you may wish to take the students outside.

2. Make sure that each set of lenses contains an "H" and a "P" lens. (The letters merely allow you to distinguish the lenses.)

3. Familiarize yourself with the pinhole-viewer assembly procedure printed on each viewer.

4. Preparing for Part Three
- Post the eye charts *upside down* in a well lit area.
- Place a one-meter strip of tape on the floor one meter in front of each chart for the children to stand behind.
- Gather as many additional lenses as you can, e.g. magnifying glass, old pair of eye glasses from a farsighted person.

5. Duplicate the Student Sheets.

THE ACTIVITY: PART ONE

1. Tell the students that today they will assemble pinhole viewers and explore the kinds of images the viewers produce.

2. Define ***Image*** as a picture of an object that you look at.
- Do not tell the students what to expect when they look through the viewer.

3. Show the students how to assemble and use their viewers as described on the viewer.

Exploring Images with the Pinhole Viewer

1. Distribute the materials to the class, and have each student assemble a pinhole viewer.

2. Invite the students to get an image on the screen of their pinhole viewers by looking through the viewers at a well lit object.
- If the students remain in the classroom point out some brightly lit objects to look at or the windows to look through.
- If outside, the students can look at any object, but *not* at the sun.
- Encourage the students to describe the images they see.

Discussing Images

1. What did your images look like? (Images are upside down and in color.)

2. Compare the images produced when the screen is close to the pinhole with those

Name _____

FINDING OUT HOW AMOUNT OF LIGHT AFFECTS THE IMAGE

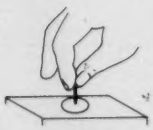
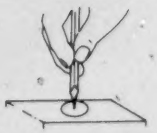
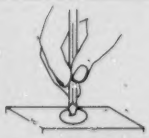
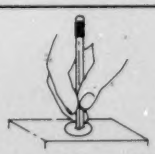
1. Predicting. I predict that when the pinhole becomes larger, the image will _____

_____

_____

2. Experimenting. Place a new foil dot on your viewer, and then experiment with pinhole sizes. Start with the smallest pinhole and make it larger as you follow this procedure:

- Make sure your pinhole looks like the one illustrated next to the instructions you are following in the "Making the Pinhole" column.
- Find the best image, and then write the corresponding scale number from the side of your viewer in the "Scale Number" column.
- Describe how big, in focus, and bright the image is.

MAKING THE PINHOLE	PINHOLE SIZE	SCALE NUMBER	DESCRIBE THE IMAGE
Push pin all the way into the foil. 			
Push *tip* of pencil into the foil. 			
Push all of the lead into the foil. 			
Push pencil all the way into the foil. 			

What size of pinhole gives you the best image? _____

Why do you think that image is the best? _____

_____

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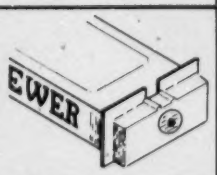
Name _____

FINDING OUT HOW LENSES CHANGE THE IMAGE

1. Make sure that your viewer has a pencil-sized pinhole before you start.
2. For each experiment:
   - Stand with your toes touching the tape.
   - Look at the wall chart.
   - Adjust your viewer to make the best image, and then write the corresponding scale number from the side of your viewer in the "Scale Number" column.
   - Record some eye chart letters that you can read from the chart in the "Eye Chart Letters" column.
   - Describe how big, bright, and in focus the image is.

YOUR PINHOLE SHOULD BE THIS BIG. ●

LENS USED	SCALE NUMBER	EYE CHART LETTERS	DESCRIBE THE IMAGE
No lens, just a *large pinhole* 			
The lens marked with the letter **H**			
The lens marked with the letter **P**			
Other lenses I used (Describe each lens, for example magnifying glass, eye glasses.)			

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produced when the screen is farther away. (Images become larger and dimmer as you pull the pinhole part of the viewer away from the section holding the screen.)

THE ACTIVITY: PART TWO

Introducing Part Two. Tell the students that now they are going to change the pinhole size to find out how the size affects the image.

Investigating the Effects of Pinhole Size on the Image

1. Give each student a copy of Student Sheet 1.
- Briefly go over the Student Sheet directions with the class.
- Ask the students to make and record their predictions.

2. If this part of the activity does not immediately follow Part One, give each student a pinhole viewer, a new foil dot, a pin, and a sharp pencil.

3. Turn on all the lights in the classroom, or take the students to the activity site.

4. Explain the procedure.
- Each student should pick one object to use in all of the pinhole tests.
- The students should keep their viewers at least one meter away from the object.
- Show the students where the extra dots, pins, and sharp pencils (or sharpener) are located.

5. Invite the students to begin their investigations.
- Encourage them to record their observations.

6. Collect the equipment before discussing the results on the Student Sheets.

Shedding Light on the Results

1. What happens to the amount of light that passes through the pinhole as you increase its size?

2. What happens to the image as the pinhole increases in size?

3. What other things did you do to achieve a clear image with different pinhole sizes?

4. If there were less light in the room, which pinhole size do you think would give you the best image? Why? (With less light a larger pinhole would be necessary to produce an equally bright image.)

5. Our eyes do not have different pinholes in them. How do you think our eyes control the amount of light that enters?
- Encourage the students to cover their eyes with their hands for 15 seconds and then watch each others' eyes after they remove their hands.

THE ACTIVITY: PART THREE

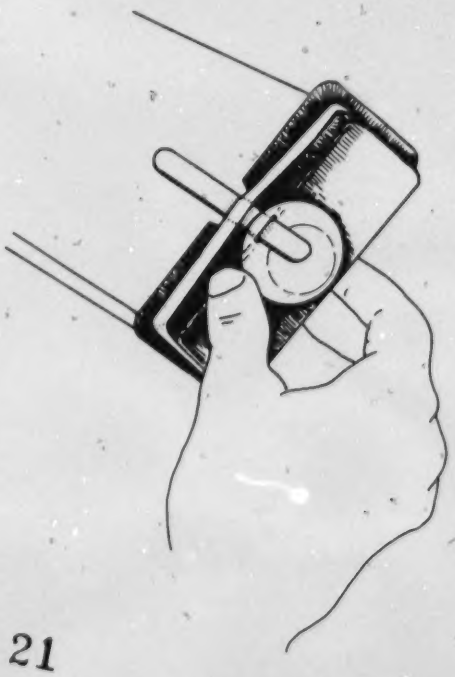
Introducing Part Three

1. Ask the class how they think they could improve the image made by the largest pinhole.
- Lenses or glasses will probably be mentioned.

2. Tell the class that in this part of the activity, they will experiment to find out what effect different lenses have on an image.

Demonstrating the Use of the Lenses

1. Show the students the lenses and how to position a lens over the large pinhole as pictured.



- Place a rubber band around the sides of the cap.
- Slip the popsicle stick under the rubber band and into the trough on the cap. About one-third of the stick should stick out beyond the cap.
- Hang a lens on the stick, letter-side away from the pinhole. Push the lens up next to the pinhole.

2. Point out the eye charts.

Investigating the Effects of Lenses

1. Distribute copies of Student Sheet 2, and explain it as necessary for your group.

2. Give each student a set of lenses and a pinhole viewer.

- Each viewer should have a foil dot with a pencil-sized (entire pencil, not just the point) pinhole in it.
- Show them where the additional lenses (optional) are located.

3. Direct the students to stand with their toes touching the tape and to look at the charts when comparing the lenses.

- Encourage the students to record the brightness, sharpness, and image sizes produced by the different lenses.
- Suggest that the students combine the two lenses.

4. Collect the materials before the discussion.

Discussing the Results

1. How did each lens affect the image?

2. What were the scale numbers (one for each lens) for your best images?

3. Which lens worked the best for you? Why?

HEALTH APPLICATIONS

1. Expert drivers say that it is dangerous to look directly at the headlights of an oncoming car.

- Why do you think this is so?
- What do you think happens to your pupils?
- Use the flashlight to demonstrate what happens when a bright light shines in the eye.

2. What can people do to help reduce the amount of light entering their eyes? (Wear sunglasses or hats with brims, or look away.)

3. How would your eyes react if you tried to read in an area with too much light? Too little light? How could these two conditions affect what you saw on the page?

HAP SIDETRIPS

Use the eye chart to get a rough test of your vision. See the instructions on the chart.

Open-House Night. Set up the charts, and test your families' eyesight, following the directions on the poster.

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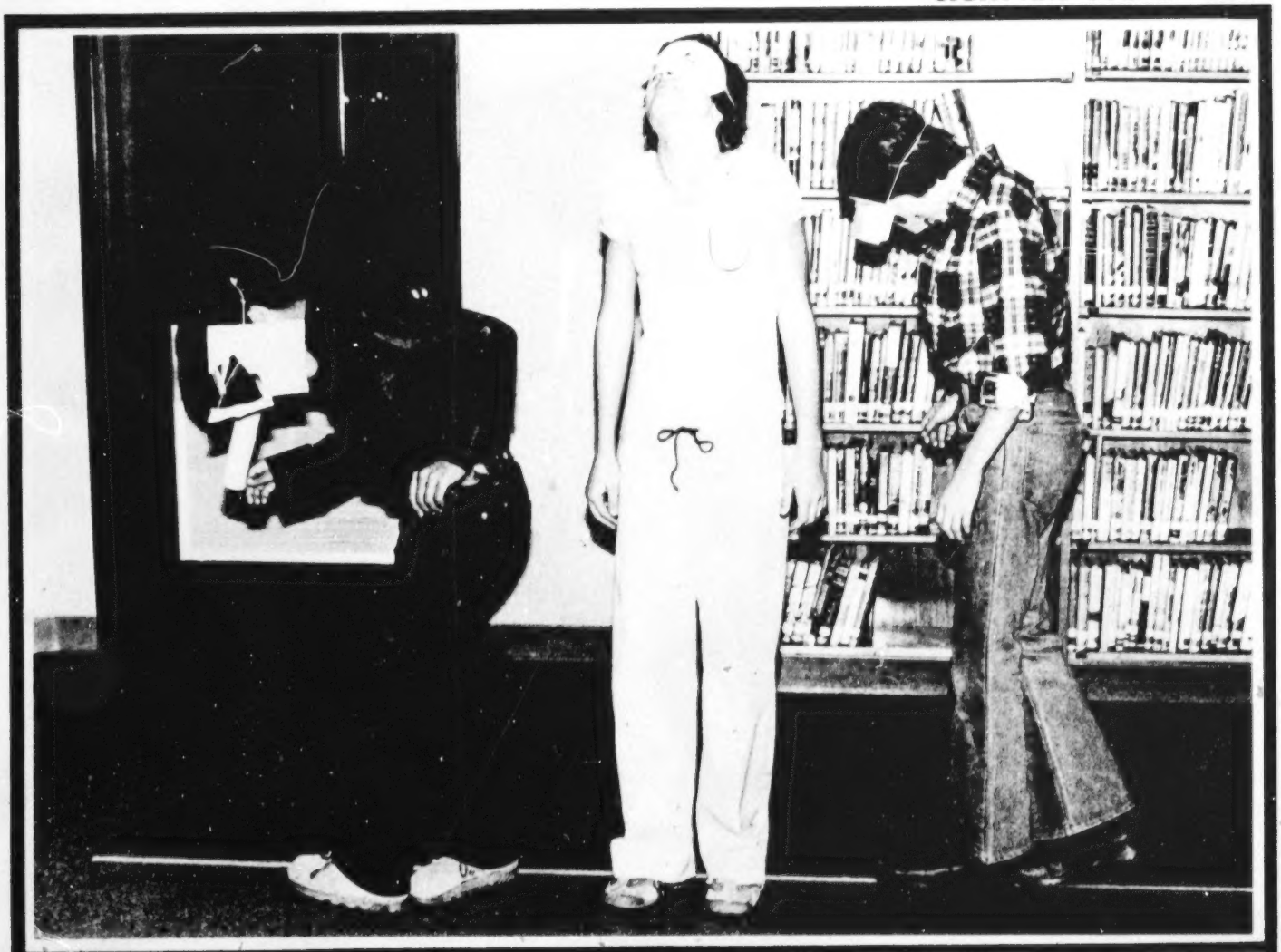
ANIMAL MASKS



OVERVIEW

By wearing vision-modifying masks while playing a game, the children discover how various fields of vision necessitate different kinds of behavior.

HEALTH BACKGROUND

Eye placement determines to a great extent how and what an animal sees and, subsequently, how it responds to its surroundings. Animals with eyes on the front of their heads can focus on an object with both eyes. These animals are usually hunters; they pursue and eat other animals. Foxes, cats, hawks, and people fall under this category.

An animal that has one eye on each *side* of its head has quite an expansive field of vision. Such an animal can detect danger quickly whether it appears in front, behind, or to the side of the animal. Animals that are pursued and eaten by other animals usually have this eye placement. Song birds, sheep, and deer fall under this category.

In this activity, the students are able to compare the advantages of different fields of vision, often gaining an appreciation of the relatively wide field of vision humans enjoy. Furthermore, the students may discover ways of compensating for changes in their own field of vision caused by injury or disease.

MATERIALS

For each student:
1 Challenge Card* (from Student Sheet AM)

For the class:
art materials*, including:
  construction paper*
  manila folders* (cut in half)
  3″ x 5″ cards*
  staples*
  scissors*
  masking tape*, transparent tape*, string* or elastic*
sheets of mirrored plastic
duplicator master of Student Sheet AM

*Provided by the teacher.

SETTING UP

Suggested Time: This activity should be conducted *after* your class has completed *Field of Vision*.

- Plan for 30 to 40 minutes for Part One.
- Plan for 45 to 60 minutes for Part Two.

Preparing for the Activity

1. Gather the art materials. These materials will be used for mask making.

- HAP has found it valuable for the students to make their own masks to meet the challenges on the Challenge Cards. If this is not possible for each of your classes, however, save the sets of masks made by your first class for use in subsequent classes.

2. Place a ten-meter-long piece of masking tape on the floor in a straight line. (This tape will be used in the Mask Walk by students who finish their masks early.)

3. Duplicate the Student Sheet, and cut apart the Challenge Cards. Each child must have one card.

THE ACTIVITY: PART ONE

Introducing the Activity. If necessary, review with the students the meaning of the term ***field of vision*** as explained in the activity *Field of Vision*.

1. Explore the students' awareness of animals' fields of vision.

- Do all animals have the same field of vision that we have?
- Name some animals that have eyes like ours, on the front of their heads (cats, dogs, chimpanzees, owls).
- Which animals have eyes on the sides of their heads? (Ducks, deer, horses.)
- How do you think the position of an animal's eyes affects how an animal lives?

2. Tell the students that they are going to make masks that will allow them to see in the way other animals see.

Describing the Mask Making. Some children initially have trouble deciding how to make their masks. For this reason, we suggest that you explain this general mask-making procedure, perhaps demonstrating some of the steps.

1. Think about how the mask described on your Challenge Card should modify your field of vision.

- Do you need to block out some of your field of vision?
- Do you need a mirror to help you extend your field of vision?

2. Make the base of your mask with a piece of manila folder or construction paper.

- Cut out any holes that you will need to look through.
- Fit the paper to your face, and make a nose hole if necessary.
- Attach string, tape, or elastic to the mask so that you can wear it.

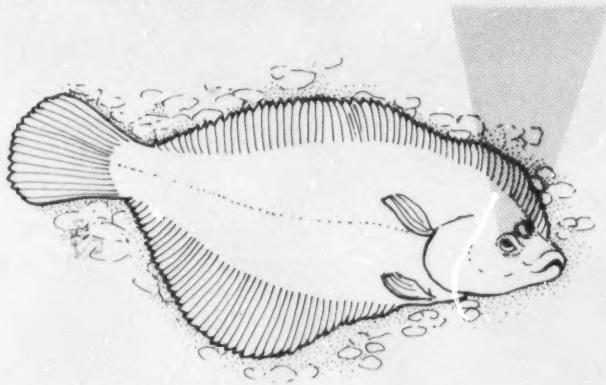
3. Tape to the mask any attachments (tubes, dividers, mirrored plastic) that will help create the field of vision described on your Challenge Card. For example:

- For an animal that can look only down, tape a visor over the eye holes.

Animal Masks

CHALLENGE CARD

Make a mask that lets you see only above you. This is the field of vision of a flounder.



Animal Masks

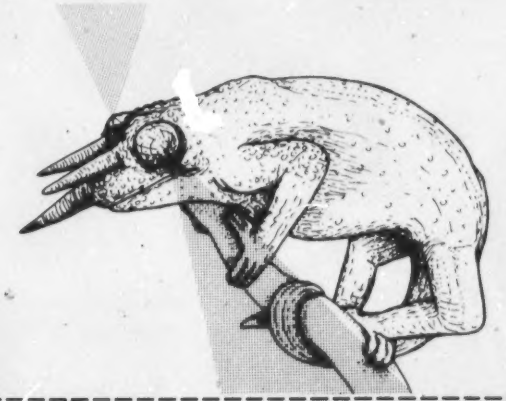
CHALLENGE CARD

Make a mask that lets you see only to the side. This is the field of vision of a robin.

Animal Masks

CHALLENGE CARD

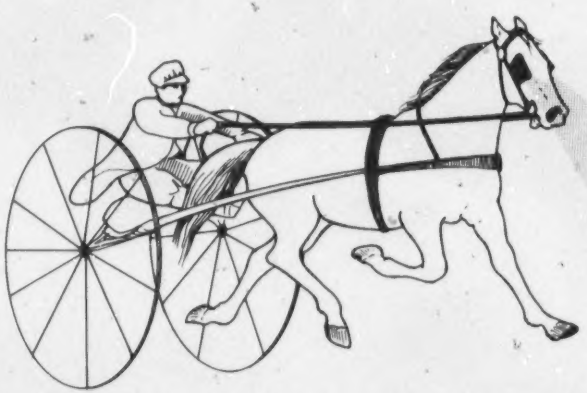
Make a mask that lets you look in two different directions at the same time. This is the field of vision of a Jackson Chameleon.



Animal Masks

CHALLENGE CARD

Make a mask that lets you see only in front of you. This is the field of vision of a horse wearing blinders.



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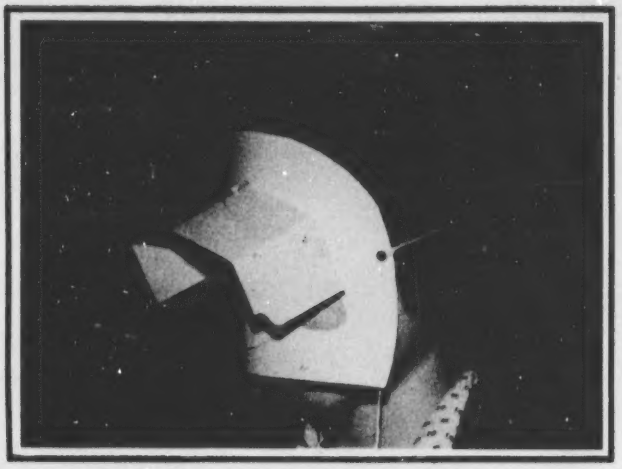
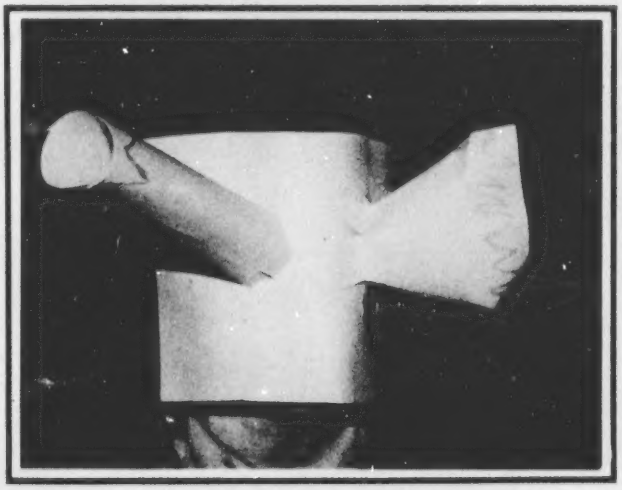


- For a snail (each eye can look in different directions at one time), tape mirrored plastic to the mask so that one eye can see behind you while your other eye can see in front of you.



4. Show the students the mask examples in this folio.

Making the Masks

1. Read each Challenge Card to the class, briefly commenting on the limits of each animal's field of vision.

2. Give each student a Challenge Card.

3. Set out or distribute the construction materials and let the students create their masks!

- Masks need not resemble animal faces; they must merely meet the challenges.
- Lend assistance where necessary.

4. For students who finish early: a Mask Walk!

- Walk the ten-meter tape line, first with and then without your mask.
- How was your masked walk different from your unmasked walk?

THE ACTIVITY: PART TWO

Introducing the Mask Treasure Hunt

1. Tell the students that they will now find out how various fields of vision affect their performance in a game.

2. Ask the students to predict how wearing the masks might change the way they search for an object.

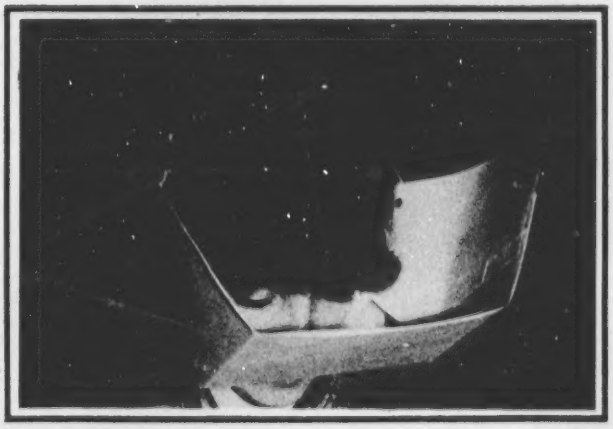
Explaining the Hunt

1. Before you conduct the first hunt:

- Select an object (ball or eraser) to hide for the search.
- Designate a "Found It" spot in the room, where searchers go after locating the object.

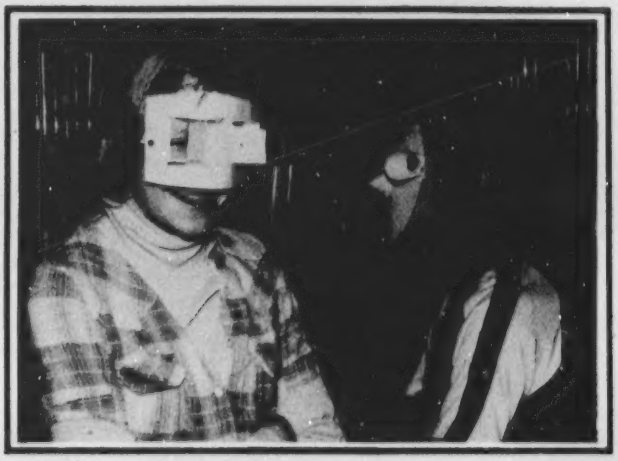
2. Explain that for each hunt, all the students with one type of mask (i.e., the students who have the same Challenge Card) leave the room.

- While they are out of the room, another student places the object somewhere in the room.
- The object can be in an unusual place, but it should be in plain sight (under a table, next to a child's foot).
- The object must *not* be hidden in a drawer or behind something.



3. The masked students return to the room and look for the object.

- They must have their masks in place as they enter the room.
- Searchers have four minutes to "find" the object.
- When a searcher visually locates the object, he leaves it in place and goes to the "Found It" spot without saying anything to the other searchers.
- The rest of the class looks for any unusual movements masked students make while walking and searching for the object.



Going Hunting

1. Send the first group out of the room, have a student hide the object, call the group back in, and let the hunt begin!

2. At the end of four minutes, ask the students to note how many students have located the object.

- Approximately how long did it take for the first searcher to locate the object?

3. Repeat the procedure with the students wearing each of the other types of masks.

- Reposition the object for each trial.
- Ask the students to look for differences in behavior between groups wearing different kinds of masks.

Analyzing the Results

1. How well did the predictions match the results?

2. What were the similarities in the way all side-vision-only students acted?

3. In order to find the object, what special way did you have to search while wearing your mask? (Turn your head? Go slower?)

4. If you had to wear your mask every day, what couldn't you do that you do now?

HEALTH APPLICATIONS

1. What do you wear that might restrict your vision?

- How could you minimize the safety problems that arise when you wear that item?

2. Your friend lost the sight of one eye in a tragic accident.

- What could you tell him about ways he can compensate (do different things to adjust) for a reduced field of vision?
- What kinds of situations would require extra precautions on his part?

HAP SIDETRIPS

Wear your masks for an hour while completing normal tasks in the classroom.

Take-Home Idea. Observe your family's or a neighbor's pet. How does the animal move its body and head to see around itself?

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FIELD OF VISION

OVERVIEW

The students discover how moving their eyes increases their total fields of vision and allows them to see more things clearly.

HEALTH BACKGROUND

The ability to move your eyes and head enables you to look in practically all directions. The majority of objects in your visual field, however, are not sharply in focus. What you see clearly depends on where you focus your eyes. If you focus straight ahead at a sign held at arm's length, the area of the sign (as opposed to a bulletin board across the room) is the only area that will be in focus. In order to see another area clearly, you must move your eyes and refocus them. Usually you move and refocus your eyes unconsciously.

This activity reinforces the importance of the role that peripheral vision plays in sports, bike riding, and other everyday activities. The students discover how limited their fields of *clear* vision are. A youngster who realizes the extent of his field of vision is more likely to notice a decrease in his vision field — a warning that professional eye care may be necessary.

MATERIALS

For each team of three:
1 vision disk
1 set of 11 sighting cards
3 copies of each Student Sheet: FOV 1* and FOV 2*

For the class:
2 eight-meter-long pieces of string*
duplicator masters of Student Sheets FOV 1 and FOV 2

*Provided by the teacher.

SETTING UP

Suggested Time: Conduct *Field of Vision* after your class has completed *Mask Relay*.

- Plan for 40 to 50 minutes for Part One.
- Plan for 40 to 50 minutes for Part Two.

Preparing for the Activity

1. Familiarize yourself with the use of the vision disk. (See the "Demonstrating the Procedure" section.)

2. Cut out a set of sighting cards for each team.

3. Duplicate the Student Sheets.

THE ACTIVITY: PART ONE

Introducing the Activity

1. To prepare the students for this activity, ask them the following kinds of questions.

- Why can't you see your hands when you put them behind your head?
- Stand with your side to the chalkboard. With your eyes focused straight ahead of you, can you see the writing on the board?
- How much do you have to move your head in order to see the writing?

2. Tell the students that they will now measure their total fields of vision and the areas in which they can read. Explain that these measurements will be made while the students focus their eyes straight ahead of them.

Demonstrating the Procedure

1. The Set Up. Invite three students to demonstrate the procedure. Organize the team as follows:

- The SUBJECT, the one whose field of vision is measured, sits at a desk or table.
- The TESTER, the one who measures, stands behind the SUBJECT.
- The RECORDER, the one who records the measurements, sits across the table from the SUBJECT.

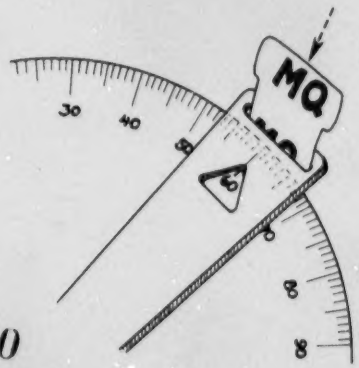
2. Give the SUBJECT a vision disk, the TESTER two sighting cards (keeping the cards out of the SUBJECT's sight), and the RECORDER a Record Sheet (Student Sheet 1).

3. SUBJECT Preparation

- The SUBJECT folds down the handles of the vision disk and places it against his forehead. (In this position, the disk resembles a giant visor.)
- He folds down the focus marker. (It should hang straight down beneath the disk.)
- Gripping the handle with both hands, he spreads his elbows and rests them on the table top for stability. (His hands should be approximately level with his mouth.)
- He looks straight ahead *under* the disk and focuses on the hole in the focus marker. (The focusing helps prevent eye movement.)

4. TESTER Preparation

- Holding the knob on the arm of the vision disk, the TESTER moves the arm to the right side of the SUBJECT's head.
- The TESTER drops one sighting card into the slit on the arm (as illustrated). The SUBJECT must *not* see the card before the test.



SUBJECT's Name_____

RECORD SHEET
MAKING EYES-FOCUSED MEASUREMENTS

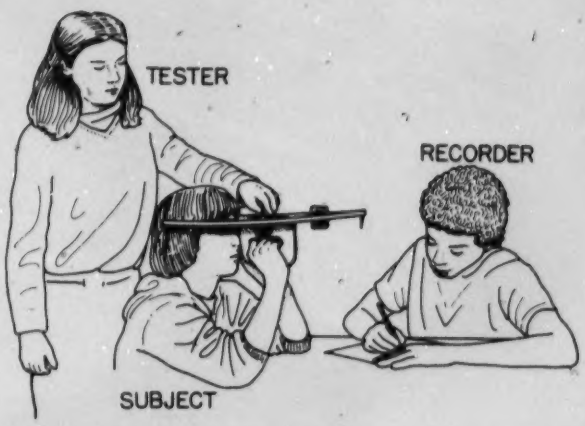
Instructions to the RECORDER:

1. Field of Vision

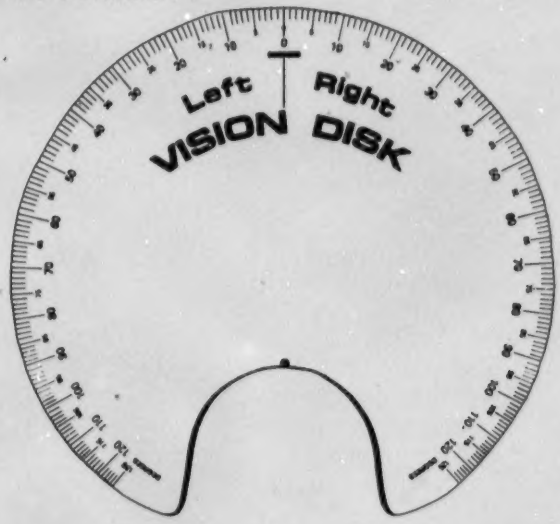
- Make sure the SUBJECT focuses his eyes on the marker.
- The SUBJECT tells you when he first sees the card.
- The TESTER gives you the measurement reading.
- Mark an **S** on the right side of the diagram below at this point.

2. Reading Field

- Make sure the SUBJECT keeps his eyes focused on the marker.
- The SUBJECT reads the letters aloud as soon as he can.
- The TESTER gives you the measurement reading.
- Mark an **R** on the right side of the diagram at this point and write the letters beside the **R.**



3. Repeat steps 1 and 2 for the SUBJECT's left side.



Question for the SUBJECT:

In what kinds of activities do you keep your eyes focused straight ahead of you?

_____

_____

_____

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HEALTH ACTIVITIES PROJECT

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SUBJECT's Name_____

RECORD SHEET
MAKING EYES-MOVING MEASUREMENTS

SUBJECT: Make your prediction!

1. First, predict where you will first see the card on each side if you can move your eyes but not your head.

- Mark your prediction on the diagram below with a **P-S.**

2. Next, predict where you will first be able to read the card if you can move your eyes but not your head.

- Mark you prediction on the diagram below with a **P-R.**

RECORDER: Record the measurements.

1. Remind the SUBJECT that she can move her eyes but not her head.

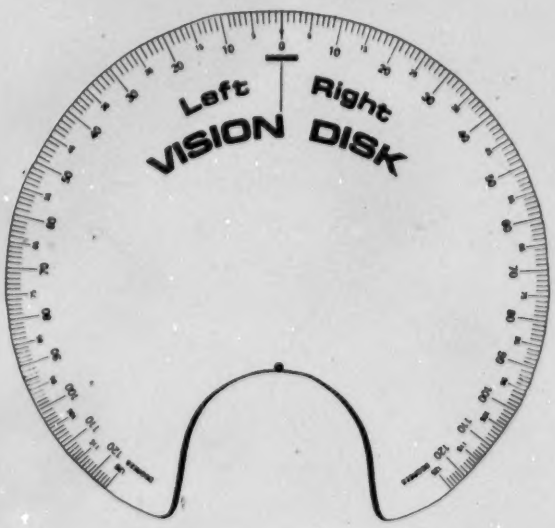
2. Field of Vision

- The SUBJECT tells you when she first sees the card on her right side.
- The TESTER gives you the measurement reading.
- Mark an **S** on the right side of the diagram below at this point.

3. Reading Field

- The SUBJECT reads the letters aloud as soon as she can.
- The TESTER gives you the measurement reading.
- Mark an **R** on the right side of the diagram at this point and write the letters beside the **R**.

4. Repeat steps 2 and 3 on the SUBJECT's left side.



SUBJECT:

How do your predictions compare to your actual measurements?

_____

How do you think knowing the size of your field of vision will be of value to you?

_____

_____

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5. Making the First Field-of-Vision Measurement

- The TESTER slowly swings the card towards the front of the SUBJECT.
- The RECORDER watches to see that the SUBJECT's eyes don't move.
- The SUBJECT announces when he first sees the card.
- The TESTER determines the degree reading at the apex of the arrow in the arm and tells the RECORDER the number.
- The RECORDER marks that point with an "S" on the right side of the disk on the SUBJECT's Record Sheet.

6. Making the First Reading-Field Measurement

- The TESTER continues to slowly move the arm towards the front of the SUBJECT.
- The RECORDER is still watching to see that the SUBJECT's eyes don't move.
- The SUBJECT says the letters aloud as soon as he can read them.
- The TESTER reads the measurement from the scale.
- The RECORDER marks that point with an "R" on the right half of the disk on the Record Sheet and writes the letters beside the "R."

7. Making the Other Two Measurements

- Steps 4, 5, and 6 are now repeated on the SUBJECT's left side.
- The TESTER uses a different sighting card.
- The RECORDER reminds the SUBJECT to keep his eyes focused on the hole in the focus marker.

Making the Eyes-Focused Measurements

1. Divide the class into teams of three.

2. Give each team a vision disk, a set of sighting cards, and three copies of Student Sheet 1.

3. Let the students make their measurements.

- Remind the teams to exchange roles and to use new sighting cards for each new SUBJECT.

4. After all the measurements have been made, collect the equipment.

5. Explain to the youngsters how to complete their Record Sheets.

Instructions for Filling out the Sheet:

Step 1: RECORDER has already marked "S" and "R" measurements

Step 2: Connect the sighting "S" and reading "R" marks to the center dot.

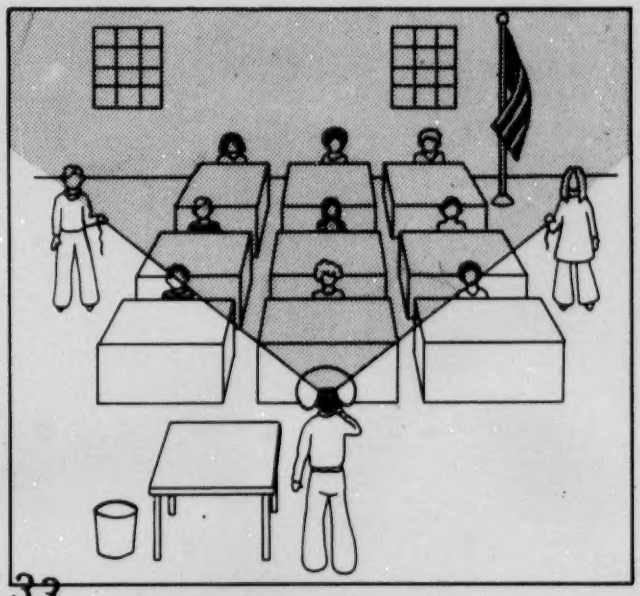
Step 3. Shade the area between the two lines from the "R" marks to the center dot. This shaded area is the angle in which you can read while your eyes are focused straight ahead.

Analyzing the Results. After the students have completed their Student Sheets, ask them what they learned about their fields of vision.

1. On the chalkboard, draw a rough diagram similar to the one on the Student Sheets.

- Poll the students for their four readings, and decide on an *approximate* average for each of the four readings.
- Mark the two "R" and two "S" average points on your drawing.
- Explain that these numbers indicate degrees to the right or left from the center of focus.
- Encourage the students to discuss their experiences in conducting the activity.

2. This demonstration will help the students visualize the extent of an average field of vision.



- Have a child hold a vision disk to his forehead while standing in the front of the room.
- Run two eight-meter pieces of string from the point of the arrow on the forehead curve of the disk through the two average field-of-vision readings.
- Explain that the strings enclose everything an average person can see when his eyes are focused straight ahead.

THE ACTIVITY: PART TWO

Introducing Part Two

1. Ask the students how they think being able to move their eyes would affect their fields of vision.

2. Tell the students that they will now measure the two fields again, but this time they can move their eyes.

Making the Eyes-Moving Measurements. To make these measurements, the students follow the general procedure used in Part One.

1. The new rule is: The SUBJECT can now move his eyes, *but not his head.*

2. Distribute copies of Student Sheet 2, and have the students predict what their eyes-moving measurements will be.

3. Distribute materials to the teams, and let the teams make their measurements and fill in their Student Sheets.

4. Collect the equipment.

Analyzing the Results

1. Ask the students to compare their predictions with their data.

- On what basis did they make their predictions?

2. To help the students compare the two experiments, ask questions such as:

- How does your data from the eyes-focused experiment compare with your data from the eyes-moving experiment?
- What do your results mean to you?

3. After the discussion, the students should realize that being able to move their eyes has at least these two effects:

- We have relatively wide fields of vision because our eyes can move.
- Our ability to selectively focus our eyes on different points allows us to see *clearly* in many different directions.

HEALTH APPLICATIONS

When you ride a bike, would you rather be able to see a few things in detail or to see movement in less detail but over a greater area? Why?

HAP SIDETRIPS

1. At what point in your field of vision can you identify shapes such as triangles, circles, and squares? Look straight ahead as you did in the first experiment. How does your "shape" field compare to your reading field?

2. At what point can you identify color? Is it the same point for all colors? Make new sighting cards for this experiment.

Take-Home Idea. Have your mother sit behind the steering wheel of your family's car and focus her eyes straight ahead. Stand about four feet away from the rear tire on the driver's side. Walk slowly forward, parallel to the car. Have your mother tell you when she can see you. Repeat the exercise, but tell your mother she can move her eyes this time. What other things could your mother do to be able to see you, or an approaching car, sooner?

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MASK RELAY

OVERVIEW

The students play bounce-ball relay with and without vision-restricting masks and compare the results.

HEALTH BACKGROUND

Our ability to react quickly often depends on how rapidly we can assess a situation. Frequently, in order to make a quick assessment, we must be able to see what is happening around us. For example, a quarterback attempting to pass a football looks for his receivers down the field. At the same time, he needs to watch for tacklers coming at him from the sides. A wide field of vision is also important when we play other games, ride bicycles, cross streets, and carry out many other everyday activities.

In these relays, the students perform a simple task, first without masks and then with masks that restrict one's field of vision. The contrast in relay teams' success between mask-on and mask-off races allows the students to discover how restriction of their peripheral vision affects their ability to react. Consequently the students discover that they compensate for this reduction in their peripheral vision with such actions as moving their eyes and heads. The students can also become aware of how certain hair styles and types of clothing can be safety hazards when they restrict one's field of vision.

MATERIALS

For each team:
1 rubber ball

For each player* on a team:
1 long mask, *or*
1 short mask, *or*
no mask

For the class:
1 Race Record Chart** (See "Preparing for the Activity.")

*Note: All the players on one team wear the same size mask, or they all go maskless.

**Prepared by the teacher.

SETTING UP

Suggested Time: We suggest that you conduct this activity before presenting *Field of Vision* and *Animal Masks*.

- Plan for 45 to 60 minutes for this activity.

Preparing for the Activity

1. Select a game site in which relay teams can be at least three meters apart (e.g. a gym, cafeteria, or hallway).

2. Preparing Race Record Charts. (See the illustration.)

	1ST PLACE	2ND PLACE	3RD PLACE
RELAY WITHOUT MASKS RELAY 1 RELAY 2 RELAY 3			
RELAY WITH & WITHOUT MASKS RELAY 1 RELAY 2 RELAY 3			
OPTIONAL RELAYS			

- Make a small chart to use at your game site.
- Draw a large chart on the chalkboard. (You will be transferring the results from the small chart to this chart during the post-race discussion.)

THE ACTIVITY

Introducing the Activity. Introduce this activity as a game, not as a rigorous experiment. Do *not* discuss peripheral vision before the game.

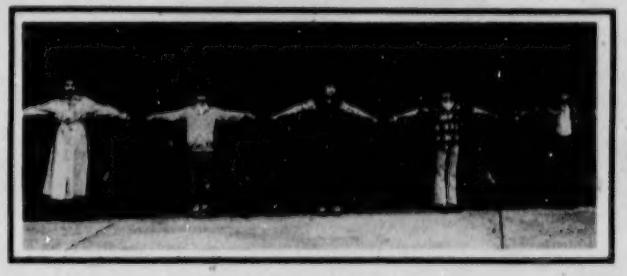
1. Take the students, the chart, balls, and masks to the relay site.

2. Divide the class equally into three teams.

3. Designate extra students as record keepers or race judges who determine order of finish.

Demonstrating the Game. Have three or four students demonstrate the procedure as you explain it.

1. The members of each team stand side-by-side in a straight line.



- The players stand so that, with their arms outstretched, their hands just touch.
- The players cannot move their feet during the race unless retrieving a lost ball.

2. You will give a ball to one person at the end of each team line.

3. At your signal, the race begins.

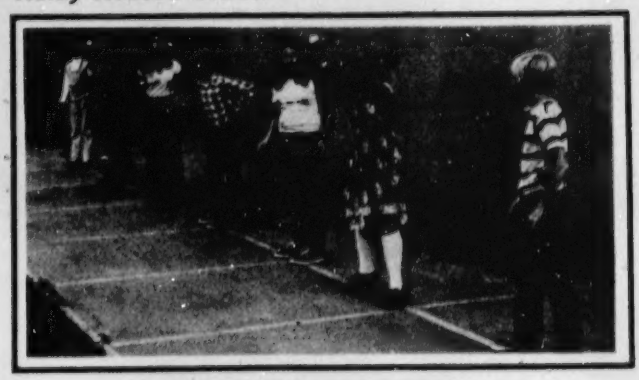
- The player with the ball passes it to the next teammate by *bouncing it once*.
- The receiver catches the ball and then bounces it to the next player.
- The team bounces the ball down the line to the last person and back up the line to the first person.
- A player who misses the ball retrieves it and puts it back into play by handing it to the person who bounced it to him.

4. The winner is the first team to move the ball down the line and back.

Playing the Game

1. Give each team a ball.

2. Conduct several practice races in which all of the teams participate without wearing masks. For each race, write the names of the teams that come in first, second, and third on your small Relay Record Chart.



3. Conducting Mask Relays

- Distribute long masks to all members of one team.
- Distribute short masks to a second team.
- The third team will not wear masks during the first race.
- Run this race three times, switching masks between teams until each team has participated in all three masked states: *maskless*, with a *long* mask, and with a *short* mask.

- Post the race results on the chart, designating each team by their masks: *long*, *short*, or *no* mask.

	1st place	2nd place	3rd place
Relay without masks			
Relay 1	Bob's team	Linda's team	Sue's team
Relay 2	Sue's team	Linda's team	Bob's team
Relay 3			
Relay with & without masks			
Relay 1	no mask	long mask	short mask
Relay 2	no mask	long mask	short mask
Relay 3	no mask	short mask	long mask
Optional relay			

4. Changing the Rules

- Invite the students to change the rules. (For example: double bounce the ball, hand the ball instead of bouncing it, or no head turning allowed.)
- In each race variation, switch the masks between the teams so that each team participates in all three masked states.
- Record the rule changes, and post the results on the Race Record Chart.

Analyzing the Results. Return to your classroom and transfer the race results to the chart on the chalkboard. Discuss the order in which teams finished the relays.

1. Ask the students:
   - What effect did wearing or not wearing a mask have on the order of finish?
   - How did wearing a mask affect your ability to catch a ball and bounce it to the next player?
   - How did the masks hinder your ability to function?
   - What did you do to compensate for a narrower range of vision while wearing the mask?

2. The discussion should touch on the following points:
   - Chance or skill shaped the results of the first set of races in which no teams wore masks.
   - The most important factor determining the results in the other races was the extent to which each team's field of vision was reduced.

3. Introduce the term ***peripheral vision*** to the students by describing it as the total area to the sides and up and down that a person can see without moving his head.

HEALTH APPLICATIONS

We have found that this discussion works best when carried out a day or so after running the races and analyzing the results.

1. Imagine that one of your friends has just read a newspaper article about the increase in glaucoma among children. The article stated that one effect of this eye disease is a reduction in a person's peripheral vision. Your friend doesn't understand why losing one's peripheral vision would matter.

- What would you tell her?

2. Your friend has now become very concerned that if she ever gets this eye disease her life would be very different.

- What could you tell her about how her life would be different, and what she could do (compensate) if she had a restricted field of vision (like the field of vision created by the masks)?

HAP SIDETRIPS

1. Wear the masks in the classroom for an hour during routine activities.

- Record the effect the masks have on your usual classroom activities.

2. Wear the masks while playing other games. (Suggest to the students that they choose games that do not involve hard objects, like baseballs, or a lot of contact.)

- How does limiting your vision with these masks affect your performance?

Take-Home Idea. Make some masks (like the ones used in this activity) for your family to wear during dinner. How does wearing the masks change your usual dinner-time routine?

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